

jc604 U.S. PTO

IN THE U.S. PATENT AND TRADEMARK OFFICE
Patent Application Transmittal Letter

jc490 U.S. PTO
09/47/810
12/17/99



12/17/99

ASSISTANT COMMISSIONER FOR PATENTS
Washington, D.C. 20231

Sir:

Transmitted herewith for filing under 37 CFR 1.53(b) is a(n): ☒ Utility ☐ Design

- ☒ original patent application,
☐ continuation-in-part application

INVENTOR(S): David D Bohn

TITLE: Display And Pointer Manipulation Using Relative Movement To A Device

Enclosed are:

- ☒ The Declaration and Power of Attorney. ☒ signed ☐ unsigned or partially signed
☒ 4 sheets of drawings (one set) ☐ Associate Power of Attorney
☐ Form PTO-1449 ☒ Information Disclosure Statement and Form PTO-1449
☐ Priority document(s) ☐ (Other) (fee \$)

CLAIMS AS FILED BY OTHER THAN A SMALL ENTITY				
(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) TOTALS
TOTAL CLAIMS	56 — 20	36	X \$18	\$ 648
INDEPENDENT CLAIMS	9 — 3	6	X \$78	\$ 468
ANY MULTIPLE DEPENDENT CLAIMS	0		\$260	\$ 0
BASIC FEE: Design \$310.00 ; Utility \$760.00				\$ 760
TOTAL FILING FEE				\$ 1,876
OTHER FEES				\$
TOTAL CHARGES TO DEPOSIT ACCOUNT				\$ 1,876

Charge \$ 1,876 to Deposit Account 08-2025. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16, 1.17, 1.19, 1.20 and 1.21. A duplicate copy of this sheet is enclosed.

"Express Mail" label no. EL357845189US

Date of Deposit 12/17/99

I hereby certify that this is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

By Linda C. Cunningham
Typed Name: Linda C. Cunningham

Respectfully submitted,

David D Bohn

By

Alexander J Neudeck

Attorney/Agent for Applicant(s)
Reg. No. 41220

Date: 12-17-99

Telephone No.: (970) 898-4931

DISPLAY AND POINTER MANIPULATION USING RELATIVE MOVEMENT TO A DEVICE

REFERENCE TO RELATED DOCUMENTS

This application is related to the subject matter described in the following two

- 5 U.S. Patents: 5,578,813 filed 2 March 1995, issued 26 November 1996 titled
FREEHAND IMAGE SCANNING DEVICE WHICH COMPENSATES FOR NON-
LINEAR MOVEMENT; and 5,644,139, filed 14 August 1996, issued 1 July 1997
titled NAVIGATION FOR DETECTING MOVEMENT OF NAVIGATION
SENSORS RELATIVE TO AN OBJECT. Both of these Patents have the same
10 inventors: Ross R. Allen, David Beard, Mark T. Smith and Barclay J. Tullis, and both
Patents were, at the time that the invention that is the subject of this application was
made, owned by the same entity or subject to an obligation of assignment to the same
entity. This application is also related to the subject matter described in U.S. Patent
5,786,804 issued 20 July 1998, titled METHOD AND SYSTEM FOR TRACKING
15 ATTITUDE, and pending divisional application based on the aforementioned issued
patent serial number 09/022097, and U.S. Patent application 09/052046, HP docket
number 10980359-1 filed 30 March 1998, titled SEEING EYE MOUSE FOR A
COMPUTER SYSTEM, all of these were, at the time that the invention that is the
subject of this application was made, owned by the same entity or subject to an

obligation of assignment to the same entity. The three patent documents describe techniques of tracking position movement and computer pointing devices. Those techniques and devices are components in the preferred embodiment described below. Accordingly, U.S. Patents 5,578,813, 5,644,139, and 5,786,804 are hereby
5 incorporated herein by reference. The related application serial number 09/022097 describes a computer mouse based on those techniques, therefore U.S. Patent application serial number 09/022097, HP docket number 10980359-1 filed 30 March 1998, titled SEEING EYE MOUSE FOR A COMPUTER SYSTEM is hereby incorporated herein by reference.

10 FIELD OF THE INVENTION

This invention relates generally to controlling a cursor, or scrolling, on a display screen. This invention relates even more particularly to methods and apparatus for controlling a cursor or scrolling on small handheld devices.

15 BACKGROUND OF THE INVENTION

The use of a hand operated pointing device for use with a computer or other electronic device and its display has become almost universal. By far the most popular of the various devices is the mouse. More recently, portable computers and personal digital appliances (PDA's) have become available that are small enough to be
20 handheld. Because a mouse is typically designed to fit comfortably in a human hand, mice are relatively large when compared to the size of these handheld devices.

Accordingly, these handheld sized devices may use a pen-like stylus, touch screen, buttons, and other things to manipulate a cursor, or control scrolling functions. One example of this is the HP CapShare 920 portable e-copier available from Hewlett-
25 Packard, Co., Palo Alto, California. This device is a handheld scanner that includes a

small liquid-crystal display (LCD) screen for displaying menus, dialog boxes, and previews of the scanned image. The user interfaces with these menus, etc. by pressing various buttons located on the device. For example, to scroll the preview of the scanned image to the left, the user presses a button shaped like a leftward pointing
5 arrow. Another example of a handheld sized device is the HP Jornada 420 palm-sized PC available from Hewlett-Packard, Co., Palo Alto, California. This device has an LCD screen and five buttons for powering on or off, recording, scrolling though and selecting text and pulling up a START menu.

Unfortunately, multiple buttons with multiple functions, and styluses, lack
10 some of the advantages that a mouse provides. For example, the graphical user interfaces (GUI's) associated with some of the most popular operating systems are easiest to learn and operate with a moving cursor controlled by a mouse (or trackball, etc.) . A typical function performed with these systems is the selection of a single icon from a distributed field of icons. With multiple buttons, this function may
15 require multiple button presses that select successive icons in orthogonal directions. When the desired icon is finally selected, yet another button must be pressed to activate the desired icon and perform some operation. In contrast, a free-floating mouse-type and cursor system only requires a natural sliding motion performed with one hand to move the cursor and a single button press on the mouse to perform the
20 operation. Another function performed with these systems is scrolling, panning, and navigating to view portions of a document that are not currently shown. With multiple buttons, each scroll, pan, or navigation is often done in discrete, predetermined, orthogonal, intervals. A free-floating mouse-type system can provide smoother movements in non-orthogonal directions that are more natural to use.

Accordingly, there is a need in the art for an improved pointing interface device and method that is suitable for use with handheld devices. Such an interface should provide the intuitive feel and familiarity of a mouse-based system without increasing the size or disrupting the unity of package of a handheld device. Such an interface should also provide an intuitive way of scrolling, panning, or performing other navigation functions. Finally, the interface should try to minimize the number of buttons on a handheld device because of cost and usability concerns.

SUMMARY OF THE INVENTION

The invention provides mouse-like functions of smooth, non-orthogonal movement of cursors, scrolling, panning, and navigating on a handheld device without a detached or semi-detached mouse-like or stylus-like part. By providing mouse-like functions, the invention preserves the intuitive feel and familiarity of a mouse based systems on a handheld device. The invention may be implemented with no moving parts, and a minimum number of buttons to perform the functions of the buttons on a mouse. Finally, the invention allows existing graphical user interfaces to be used on handheld devices without redesigning the workflow or defining special keys for navigating a cursor or selecting graphical objects.

An embodiment of the invention uses navigation sensors on a handheld device with a display to detect and measure motion of that device relative to a surface in close proximity to the navigation sensor. This relative motion may be created by moving the entire device around a surface on which the device is placed, or it may be created by moving a finger or other body part in front of the navigation sensor. The relative motion of the device is then used to move a cursor on the display, or pan or

otherwise navigate what is shown on the display. In one embodiment, the navigation sensors are placed on the opposite side of the device as the display. This allows the user to slide the device around the surface it is placed on to manipulate the display while viewing the face-up display. In another embodiment, the navigation sensors are placed on the bottom of a two part hinged device. This allows the user to slide the device around the surface it is placed on to manipulate the display that is conveniently angled for viewing by the hinge. In another embodiment, the navigation sensors serve a dual function. The first function is to aid in the capture of a scanned image by a handheld scanner. Then, after an image has been acquired, the same navigation sensors are used to manipulate the display.

Other aspects and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an illustration of a handheld digital appliance with attached display.

FIG. 2A is an illustration of a two part hinged device with attached display in an open position.

FIG. 2B is an illustration of a two part hinged device with attached display in a closed position.

FIG. 3 is an illustration of a handheld scanning device with attached display.

FIG. 4 is an illustration of a handheld scanning device with an attached display located on the top of the device.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1-4 show handheld electronic devices useful for performing any of multiple computing, business, entertainment, and communication tasks. In addition,

FIG. 3 and FIG. 4 show electronic devices that are also useful for scanning an image-bearing surface. In FIG. 1, the electronic device 1000 includes a display 1002 and two buttons 1004, 1006 located on a top surface 1010. Located on a bottom surface is a navigation sensor 1008. Navigation sensor 1008 is used to track the movement of the device 1000 relative to a surface upon which the device is placed. Navigation sensors of several types are disclosed and described in the documents mentioned above in the section REFERENCE TO RELATED DOCUMENTS. Accordingly, those documents mentioned above in that section are hereby incorporated herein by reference.

Navigation sensor 1008 effectively observes a moving image of the surface in front of navigation sensor 1008. This motion may be created by placing device 1000 upon a surface and moving the entire device, or by moving a part of the user in front of navigation sensor 1008. Navigation sensor 1008 produces an indication of the displacement in two planar dimensions between successive observations. This indication of displacement is used by device 1000 to manipulate what is shown on display 1002. For example, the indications of displacement may be used by device 1000 to control a cursor that is shown on display 1002. In this manner, the user may move device 1000 which would, in turn, move the position of a cursor shown on display 1002. This coordination of device movement to cursor movement could then be used with a graphical user interface (GUI) and buttons 1004 and 1006 to control the operation of device 1000 much like the movement of a mouse controls the operation of a GUI on a desktop personal computer.

The indications of displacement may also be used to perform other functions that manipulate what is shown on display 1002. For example, the indications of displacement may be used to control panning, scrolling, or other image navigation functions. This would allow the user to move the device 1000 in a desired direction

to see regions of an image that are not presently displayed on display 1002. This provides the user a natural feel for these operations that is similar to moving a magnifying glass over an area of interest.

In FIG. 2A and 2B, the electronic device 2000 includes a system unit 2002 and
5 a display unit 2004. The system unit 2002 includes a keyboard 2006, buttons 2014, 2016, and navigation sensor 2020. Navigation sensor 2020 shown located on the bottom surface of system unit 2002. Keyboard 2006 and buttons 2014, 2016 are shown located on the top surface of system unit 2002. The display unit 2004 includes display panel 2008 and display panel housing 2010. The display unit 2004 is attached
10 to the system unit 2002 and rotates on hinge 2012 between an open position (shown in FIG. 2A) and a closed position (shown in FIG. 2B). Navigation sensor 2020 effectively observes a moving image of the surface in front of navigation sensor 2020. This motion may be created by placing device 2000 upon a surface and moving the entire device, or by moving a part of the user in front of navigation sensor 2020. This
15 relative movement can be used to manipulate what is shown on the display 2008 and control the device 2000 as described above.

FIG. 2A and 2B show buttons 2014 and 2016 located on the top surface of system unit 2002. This would allow the user to grasp the system unit between the thumb and middle finger and use the index finger to press buttons 2014 and 2016.
20 However, this is just one of many possibilities. Buttons 2014 and 2016 may be located in other positions and other surfaces or may be not included in the device completely. For example, if buttons 2014 and 2016 are not included, then the user may perform the same functions by pressing certain keys on keyboard 2006 with an index finger. Another possibility is to locate buttons 2014 and 2016 on the front

vertical surface of system unit 2002. This would allow the user to grasp the unit between the thumb and index finger and press these buttons with a thumb.

FIG. 3 is an illustration of a handheld scanning device 3000 with attached display 3002. The scanning device 3000 includes a display 3002 that may provide almost immediate viewing of a captured image. Scanning device 3000 also includes buttons 3004 and 3006. Buttons 3004 and 3008 can be used to aid in interfacing with a GUI, image capture, or image navigation.

In FIG. 3, the forward side of the scanning device 3000 includes navigation sensors 3008 and 3010 and imaging sensor array 3012. Typically, when the device is being used to scan an image, this forward side is placed toward the image to be captured and the device is moved around the image to capture it. In this position, the navigation sensors 3008 and 3010 are in close proximity to the surface with the image on it and are able to effectively observe a moving image of the surface device 3000 is placed upon and produces an indication of the displacement in two planar dimensions between successive observations. Also, display 3002 is angled slightly off perpendicular with this forward side to improve the viewability of display 3002 when device 3000 is in this position.

Device 3000 uses navigation sensors 3008 and 3010 to manipulate a GUI or scroll through an image while viewing display 3002. Navigation sensors 3008 and 3010 are also used during image capture. This allows the function of one or more of the navigation sensors 3008 and 3010 to be shared between display manipulation and image capture without additional hardware. It also allows capture verification to be very intuitive. To verify the image capture, the user would place the forward side in FIG. 3, against a surface and move it around. Alternatively, the user could hold the device and move a finger or other body part over at least one of the navigation sensors

3008 and **3010**. The display **3002** would appear to the user to be moving around the captured image. One of buttons **3004** and **3006** could be used to activate a navigate mode that moves a captured image around the display in response to the movement of device **3000** or movement of the users finger. Finally, since most GUI and scrolling functions do not require the positional accuracy that scanning does, the indications of displacement produced by navigation sensors **3008** or **3010** may be downsampled. This would reduce the compute requirements associated with handling the indications of displacement when an image was not being captured.

FIG. 4 is an illustration of a handheld scanning device **4000** with attached display **4002** on the top of the device. The scanning device **4000** includes a display **4002** on the top of the device that may provide almost immediate viewing of a captured image. Scanning device **4000** also includes buttons **4004**, **4006**, and **4014** on top of the device. Buttons **4016** and **4018** are shown positioned on a vertical side of scanning device **4000**. Any of buttons **4004**, **4006**, **4014**, **4016**, and **4018** can be used to aid in interfacing with a GUI, image capture, or image navigation.

In FIG. 4, the bottom side of the scanning device **4000** includes navigation sensors **4008** and **4010** and imaging sensor array **4012**. Typically, when the device is being used to scan an image, this bottom side is placed toward the image to be captured and the device is moved around the image to capture it. In this position, the navigation sensors **4008** and **4010** are in close proximity to the surface with the image on it and are able to effectively observe a moving image of the surface device **4000** is placed upon and produces an indication of the displacement in two planar dimensions between successive observations. Also, display **4002** may angled slightly off level to improve the viewability of display **4002** when device **4000** is in this position.

Device 4000 uses navigation sensors 4008 and 4010 to manipulate a GUI or scroll through an image while viewing display 4002. Navigation sensors 4008 and 4010 are also used during image capture. This allows the function of one or more of the navigation sensors 4008 and 4010 to be shared between display manipulation and image capture without additional hardware. It also allows capture verification to be very intuitive. To verify the image capture, the user would place the bottom side in FIG. 4, against a surface and move it around. Alternatively, the user could hold the device and move a finger or other body part over at least one of the navigation sensors 4008 and 4010. The display 4002 would appear to the user to be moving around the captured image. One of buttons 4004, 4006, 4014, 4016, and 4018 could be used to activate a navigate mode that moves a captured image around the display in response to the movement of device 4000 or the users finger. Finally, since most GUI and scrolling functions do not require the positional accuracy that scanning does, the indications of displacement produced by navigation sensors 4008 or 4010 may be downsampled. This would reduce the compute requirements associated with handling the indications of displacement when an image was not being captured.

Although several specific embodiments of the invention have been described and illustrated, the invention is not to be limited to the specific forms or arrangements of parts so described and illustrated. The invention is limited only by the claims.

CLAIMS

What is claimed is:

1. An electronic device, comprising:
a display showing an image; and,
5 a navigation sensor, whereby a movement of said electronic device is sensed
by said navigation sensor and said movement includes moving said
display and said movement produces a change in said image that is
showing on said display.
- 10 2. The electronic device of claim 1 wherein said change comprises at least
moving a cursor.
3. The electronic device of claim 1 wherein said change comprises at least
panning at least part of said image that is showing on said display.
- 15 4. The electronic device of claim 1 wherein said change comprises at least
scrolling at least part of said image that is showing on said display.
5. The electronic device of claim 1 wherein said change comprises at least
20 navigating at least part of said image that is showing on said display.
6. The electronic device of claim 1 further comprising:
a first button, whereby said movement of said electronic device and said first
button may be operated in cooperation to mimic at least one function
25 of a computer mouse being used with a graphical user interface.

7. The electronic device of claim 6 further comprising:

a second button, whereby said movement of said electronic device, said first
button, and said second button may be operated in cooperation to
mimic more than one function of a computer mouse being used with a
graphical user interface.

8. An electronic device, comprising:

a display;
a navigation sensor coupled to said display whereby said navigation sensor
detects a movement of said electronic device that includes movement
of said display and an image displayed on said display is altered in
response to said movement.

9. The electronic device of claim 8 wherein said image displayed on said
display is altered in response to said movement by moving an image of
a cursor.

10. The electronic device of claim 8 wherein said image displayed on said
display is altered in response to said movement by panning a second
image displayed on at least part of said display.

11. The electronic device of claim 8 wherein said image displayed on said display is altered in response to said movement by scrolling a second image displayed on at least part of said display.

5 12. The electronic device of claim 8 wherein said image displayed on said display is altered in response to said movement by showing a different part of a second image part of which is displayed on at least part of said display.

10 13. The electronic device of claim 8 further comprising:
a first button, whereby said movement of said electronic device and said first button may be operated in cooperation to mimic at least one function of a computer mouse being used with a graphical user interface.

15 14. The electronic device of claim 13 wherein a graphical user interface is being displayed on said display.

15. The electronic device of claim 13 further comprising:
a second button, whereby said movement of said electronic device, said first
20 button, and said second button may be operated in cooperation to mimic more than one function of a computer mouse being used with a graphical user interface.

25 16. The electronic device of claim 15 wherein a graphical user interface is being displayed on said display.

17. A method of manipulating an image displayed by a device on a display,
comprising:

moving the entire device including said display.

5

18. The method of claim 17, further comprising:

moving a cursor displayed on said display.

19. The method of claim 17, further comprising:

10 scrolling at least part of said image displayed on said display.

20. The method of claim 17, further comprising:

panning at least part of said image displayed on said display.

15 21. The method of claim 17, further comprising:

showing a different part of a second image at least part of which is displayed
on said display.

22. A method of manipulating an image displayed on a display, comprising:

20 detecting a movement of a device that includes said display; and,
altering said image in response to said movement.

23. The method of claim 22, further comprising:

moving a cursor displayed on said display.

25

24. The method of claim 22, further comprising:
scrolling at least part of said image displayed on said display.

25. The method of claim 22, further comprising:
panning at least part of said image displayed on said display.

26. The method of claim 22, further comprising:
showing a different part of a second image at least part of which is displayed
on said display.

27. An electronic scanning device, comprising
an image sensor for scanning an image;
a display that displays a first part of a scanned version of said image,
a navigation sensor that detects relative movement between said scanning
device and a surface whereby said relative movement changes said
display to displaying a second part of said scanned version of said
image.

28. The electronic scanning device of claim 27 wherein said relative
movement may also move a cursor displayed on said display.

29. The electronic scanning device of claim 27 wherein said second part of
said scanned version of said image is a scrolled in relation to said first
part of said scanned version of said image.

30. The electronic scanning device of claim 27 wherein said second part of said scanned version of said image is a panned in relation to said first part of said scanned version of said image.

5 31. The electronic scanning device of claim 27 wherein said second part of said scanned version of said image is displaced in two directions in relation to said first part of said scanned version of said image.

10 32. A method of previewing a scanned image, comprising:
displaying a first part of a scanned image;
displaying a second part of said scanned image in response to relative movement between a scanning device and a surface.

15 33. The method of claim 32 wherein said second part of said scanned image is scrolled in relation to said first part of said scanned image.

34. The method of claim 32 wherein said second part of said scanned image is panned in relation to said first part of said scanned image.

20 35. The method of claim 32 wherein said second part of said scanned image is displaced in two directions in relation to said first part of said scanned image.

25 36. An electronic device, comprising:
a display showing an image; and,

a navigation sensor, whereby a movement of a part of a user is sensed by said navigation sensor and said movement produces a change in said image that is showing on said display and wherein said movement does not include movement of said device.

5

37. The electronic device of claim 36 wherein said change comprises at least moving a cursor.

38. The electronic device of claim 36 wherein said change comprises at least panning at least part of said image that is showing on said display.

39. The electronic device of claim 36 wherein said change comprises at least scrolling at least part of said image that is showing on said display.

40. The electronic device of claim 36 wherein said change comprises at least navigating at least part of said image that is showing on said display.

41. The electronic device of claim 36 further comprising:
a first button, whereby said movement of said part of said user and said first button may be operated in cooperation to mimic at least one function of a computer mouse being used with a graphical user interface.

42. The electronic device of claim 41 further comprising:
a second button, whereby said movement of said part of said user, said first button, and said second button may be operated in cooperation to

mimic more than one function of a computer mouse being used with a graphical user interface.

5 43. An electronic device, comprising:

a display;

a navigation sensor coupled to said display whereby said navigation sensor detects a movement of a part of a user wherein said movement does not include movement of said device and an image displayed on said display is altered in response to said movement.

10

44. The electronic device of claim 43 wherein said image displayed on said display is altered in response to said movement by moving an image of a cursor.

15

45. The electronic device of claim 43 wherein said image displayed on said display is altered in response to said movement by panning a second image displayed on at least part of said display.

20

46. The electronic device of claim 43 wherein said image displayed on said display is altered in response to said movement by scrolling a second image displayed on at least part of said display.

25

47. The electronic device of claim 43 wherein said image displayed on said display is altered in response to said movement by showing a different

part of a second image part of which is displayed on at least part of
said display.

48. The electronic device of claim 43 further comprising:

5 a first button, whereby said movement of said part of said user and said first
button may be operated in cooperation to mimic at least one function
of a computer mouse being used with a graphical user interface.

49. The electronic device of claim 48 wherein a graphical user interface is
10 being displayed on said display.

50. The electronic device of claim 48 further comprising:

15 a second button, whereby said movement of said part of said user, said first
button, and said second button may be operated in cooperation to
mimic more than one function of a computer mouse being used with a
graphical user interface.

51. The electronic device of claim 50 wherein a graphical user interface is
being displayed on said display.

52. A method of manipulating an image displayed by a device on a display,
comprising:

moving a part of a user in front of a navigation sensor wherein said navigation
sensor is on the opposite side of said device as said display.

25

53. The method of claim 52, further comprising:
moving a cursor displayed on said display.

54. The method of claim 52, further comprising:

5 scrolling at least part of said image displayed on said display.

55. The method of claim 52, further comprising:

panning at least part of said image displayed on said display.

56. The method of claim 52, further comprising:

showing a different part of a second image at least part of which is displayed
on said display.

15

ABSTRACT

Mouse-like functions of smooth, non-orthogonal movement of cursors, scrolling, panning, and navigating are provided on a handheld device without a detached or semi-detached mouse-like or stylus-like part. Existing graphical user interfaces are used on handheld devices without redesigning the workflow or defining special keys for navigating a cursor or selecting graphical objects. Navigation sensors on a handheld device with a display to detect and measure relative motion of a surface in front of the navigation sensor. This relative motion is then used to move a cursor on the display, or pan or otherwise navigate what is shown on the display. The navigation sensors are placed on the opposite side of the device as the display or on the bottom of a two part hinged device. This allows the user to slide the device around the surface it is placed on to manipulate the display while viewing the display. The user may also move a finger or other body part in front of the navigation device to manipulate the display while viewing the display. The navigation sensors may also serve a dual function. The first function is to aid in the capture of a scanned image by a handheld scanner. Then, after an image has been acquired, the same navigation sensors are used to manipulate the display.

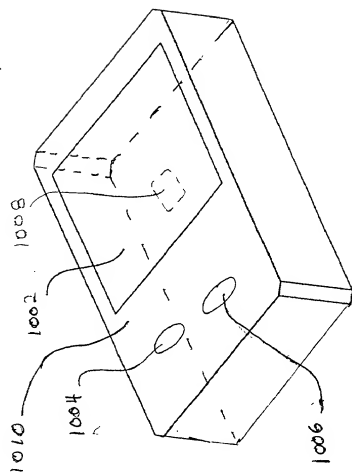


FIG. 1

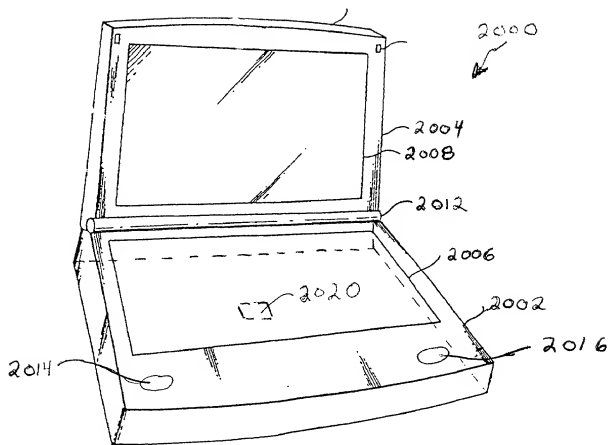


FIG 2A

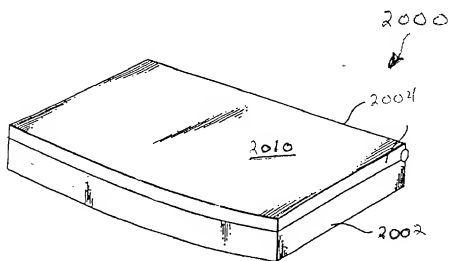


FIG 2B.

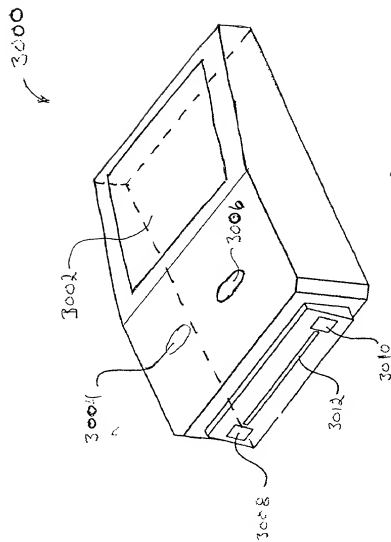


FIG. 3

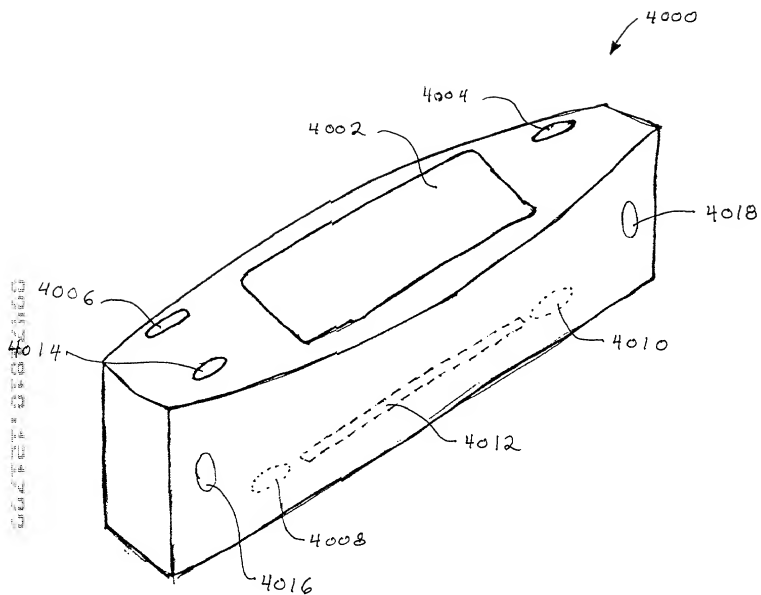


FIG. 4

DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATIONATTORNEY DOCKET NO. 10991692-1

As a below named inventor, I hereby declare that:

My residence/post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Display And Pointer Manipulation Using Relative Movement To A Device

the specification of which is attached hereto unless the following box is checked:

() was filed on _____ as US Application Serial No. or PCT International Application Number _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understood the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose all information which is material to patentability as defined in 37 CFR 1.56.

Foreign Application(s) and/or Claim of Foreign Priority

I hereby claim foreign priority benefits under Title 35, United States Code Section 119 of any foreign application(s) for patent or inventor(s) certificate listed below and have also identified below any foreign application for patent or inventor(s) certificate having a filing date before that of the application on which priority is claimed:

COUNTRY	APPLICATION NUMBER	DATE FILED	PRIORITY CLAIMED UNDER 35 U.S.C. 119
N/A			YES: _____ NO: _____
			YES: _____ NO: _____

Provisional Application

I hereby claim the benefit under Title 35, United States Code Section 119(e) of any United States provisional application(s) listed below:

APPLICATION SERIAL NUMBER	FILING DATE
N/A	

U. S. Priority Claim

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

APPLICATION SERIAL NUMBER	FILING DATE	STATUS (patented/pending/abandoned)
N/A		

POWER OF ATTORNEY:

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

Customer Number 022879Place Customer
Number Bar Code
Label hereSend Correspondence to:
HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, Colorado 80528-9599**Direct Telephone Calls To:**Alexander J Neudeck
(970) 898-4931

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Inventor: David D BohnCitizenship: USResidence: 2900 Eindborough Dr Ft Collins CO 80525Post Office Address: Same as residenceInventor's Signature Date Dec 16, 1999